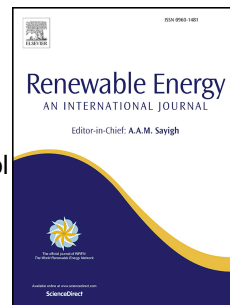


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Utilization of by-product glycerol from bio-diesel plants as feedstock for 2,3-butanediol accumulation and biosynthesis genes response of *Klebsiella variicola* SW3

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1 **Utilization of by-product glycerol from bio-diesel plants as feedstock for 2,3-**
2 **butanediol accumulation and biosynthesis genes response of *Klebsiella***
3 ***variicola* SW3**

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17
18 **ABSTRACT**

19 The booming of biodiesel industry all over the world has led to generate a large amount (10%
20 v/v) of crude glycerol, created an oversupply problem. Herein, we compared the product
21 concentrations of major metabolic products attained from pure and crude glycerol
22 biotransformation process using an adapted mutant strain *Klebsiella variicola* SW3. Real-time
23 qPCR and glycerol dehydrogenase (GDH) enzyme activity assay revealed that the
24 overexpression of GDH gene resulted in an increased GDH enzyme activity, led to a markedly
25 boosted 2,3-butanediol (2,3-BD) production. Based on these results, the SW3 strain obtained
26 from wild type strain *Klebsiella variicola* SRP3 displayed a 1.39-fold increased 2,3-BD
27 production of 82.5 g/L from 59.3 g/L, yielding 0.62 g/g using pure glycerol. However, in a
28 batch culture, a final 33.5 g/L of 2,3-BD was accumulated within 96h from 50 g/L glycerol.
29 Moreover, the strain SW3 withstanding high concentration (200 g/L) of crude glycerol
30 displayed 64.9 and 29.25 g/L 2,3-BD in fed-batch and batch cultures respectively. Therefore,

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